Looking Toward The Future

EES 3310/5310

Global Climate Change

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Class #42: Friday April 30 2021

Final Exam

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- Posted to Brightspace
- Due 2:00 PM, May 10
- Turn it in on Brightspace
  - Take-Home Final Exam assignment
- 2 essay questions
- Open book, notes, etc.

Questions and Discussion

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- Questions you have about climate change
  - Science
  - Technology
  - Policy
- Thoughts and Discussion:
  - About what we’ve read
  - About what the future of climate holds
  - About policy options

Reviewing the Semester

- What do we know? (Science)
- What can we do? (Technology, Policy)
- How can we decide? (Politics, Ethics)

What Do We Know?

What Do We Know for Sure?

- Human activity is raising CO_2 to the highest levels in more than 800,000 years
- The planet is rapidly warming
- The greenhouse effect is well-established science
- Rising levels of CO_2 make oceans acidic

What Do We Know Very Confidently?

- Human activity is responsible for most observed warming
- CO_2 levels will remain high for thousands of years after we stop burning fossil fuels
- Even if CO_2 stops rising, temperature and sea level will continue to change for centuries

What Do We Know With Some Uncertainty?

- The planet will warm around 3°C for every doubling of CO_2
- Sea-level will rise 1–2 meters this century
- Extreme heat waves will become much more common
- Drought will become more common in much of the world

What Do We Not Know (Much Uncertainty)?

- Regional responses to climate change (e.g., Tennessee)
- Details about drought, rain, floods, etc.
- Tipping points for catastrophe (runaway sea-level rise, runaway methane releases, …)
- Severe storms (hurricanes, tornadoes, …)
- Impacts on agriculture

What Can We Do?

What Can We Do?

- Mitigate Warming:
  - Efficiency (less energy)
  - Clean energy
    - Nuclear
    - Solar
    - Wind
    - …
- Adaptation
- Geoengineering

How Can We Do it?

- “Top-Down” Policy:
  - Use science to choose temperature goal
  - Temperature → GHG concentration
  - GHG concentration → emissions
  - Emissions → clean energy requirements
- “Bottom-Up” Policy:
  - What measures are most practical?
  - How can we combine them into coherent policy?

How Can We Decide?

Problems for Politics

- Dangers are serious, uncertain, and irreversible
- Climate change is not the only danger
  - How do we set priorities?
  - What principles to use?
    - Maximize expected utility
    - Insurance approach
    - Social justice
- Emissions are today, most damage is far in the future
  - How to balance needs & capabilities of current and future generations?